REMARKS

This paper is responsive to an Office Action mailed December 10, 2007. Prior to this response, claims 1, 3-4, 7-8, 10, 12-13, and 16-18 were pending. After amending claims 1, 7, 10, 13, and 16-18, claims 1, 3-4, 7-8, 10, 12-13, and 16-18 remain pending.

In Section 6 of the Office Action claims 1, 3-4, 7-8, 10, 12-13, and 16-18 have been rejected under 35 U.S.C. 103(a) as being unpatentable with respect McGraw (US 6,542,261) in view of Chan et al. ("Chan"; US 6,378,070). With respect to claims 1 and 10, the Office Action acknowledges that McGraw fails to compare an access code to a password in the file, but that Chan discloses this feature, and that it would have been obvious to incorporate Chan's features into McGraw, since a document is only printed when the intended recipient interacts with the printing apparatus. This rejection is traversed as follows.

The Office Action (page 3) states that in McGraw, the code is known by the intended recipient. More explicitly, McGraw states that a user must provide a code (on the transmit side) to create a secure fax (col. 6, ln. 28-33). However, McGraw clearly states that only the bit map (the encrypted message) and the unencrypted header are transmitted (col. 6, ln. 34-36). Fig. 4 depicts a secure fax with a bitmap (encrypted message) portion and an unencrypted header. The secure fax does not include a section for a password (encrypted or unencrypted) that is sent with the fax. Thus, although the encrypted portion of the fax can only be decrypted using a password entered by the recipient, the password is not sent with the fax.

In contrast, the claim invention transmits a password with an encrypted document. The recipient must enter a password on the receive-side that matches the transmitted password. Claims 1 and 10 have been amended to more clearly recite this distinction.

The Office Action (page 4) states that there must inherently be some kind of comparison step to verify that the code entered by the recipient is the correct code to decrypt the document. In response, the Applicant notes that McGraw cannot inherently disclose a password matching process. The bitmap portion of the secure fax is decrypted in response to the password entered by the recipient. In other words, the password is "matched" only in the sense that there is only one password that correctly decrypts the bitmap (col. 6, ln. 51-56). In contrast, the claimed invention recites a 2-step identification process. First, the password entered by the recipient is compared to the transmitted password. If the passwords match, then the document is decrypted. Note: in the claimed invention, the password is not necessarily used as a key to encrypt or decrypt the document. In McGraw, the password is used as a decryption key.

The Office Action acknowledges that McGraw's unencrypted header identifies the intended recipient, citing col. 3, ln. 6-11. In contrast, the Applicant's unencrypted header identifies the encrypted document, not the recipient.

McGraw transmits a secure fax. On the receiving end, a paper document is created with a header section and a main body section (Fig. 4). As noted above, the header includes the recipient's name in an unencrypted

form, and the main body includes a bitmap. "The bitmap and the unencrypted header are combined into a standard style FAX document and transmitted via a communication system as a normal FAX in step S18" (col. 6, ln. 34-36). Alternately stated, a fax transmission sends an image, not a message differentiated into message components. Even if the information printed at the top of a fax page represents header information to a human viewer, the electronic fax transmission does not include message segment that can identified as a "header". The Applicant has included an article addressing the electronic format of a fax transmission (Appendix A). See especially, "Phase C – Message Transmission".

In contrast, claims 1 and 10 recite transmitting an electronic file. The electronic file includes an electronic file header. It is well understood in the art that an electronic file header is quite different from the header section at the top of a paper document.

Chan discloses a method of securely transmitting a document so that only the intended recipient can receive it. More explicitly, Chan describes a process where the sender stores a document, encrypted with a session key at a print server. The session key is also encrypted and stored in the server with a first identifier. The recipient sends a second identifier from the printer to the print server. The print server compares the first identifier to the second identifier. If the identifiers match, the server sends the encrypted document and encrypted session key to the printer. A user's smart card decrypts the session key, which can then be used to recover the encrypted document (Abstract).

An invention is unpatentable if the differences between it and the prior art would have been obvious at the time of the invention. As stated

in MPEP § 2143, the *KSR International Co. v Teleflex Inc.* decision (82 USPQ2d 1385, 1395-1397, 2007) suggest 7 exemplary rationales to support a conclusion of obviousness, which include:

A) Combining prior art elements according to known methods to yield predictable results;

B) Simple substitution of one known element for another to obtain predictable results;

C) Use of known technique to improve similar devices (methods, or products) in the same way;

D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

E) "Obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;

F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;

G) Some teaching, suggestion, or motivation in prior art would have lead one of ordinary skill to modify the prior art reference or the combine prior art references teachings to arrive at the claimed invention.

The Office Action states that Chan suggests modifications to McGraw that would have been obvious to one of ordinary skill in the art. This rejection appears to be most closely grounded in the G) rationale - Some teaching, suggestion, or motivation in prior art would have lead one of ordinary skill to modify the prior art reference or the combine prior art references teachings to arrive at the claimed invention.

With respect to the G) rationale, MPEP 2143 (G) states that the rejection must articulate the following criteria to resolve the *Graham* factual analysis:

(1) a finding that there was some teaching, suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings;

(2) a finding that there was a reasonable expectation of success; and

(3) whatever additional findings based on the Graham factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness.

With respect to the above-referenced first factual analysis criteria, the Chan and McGraw references have been combined based upon the assumption that the combination discloses every limitation recited in Applicant's claims 1 and 10. However, neither Chan nor McGraw discloses transmitting an electronic file with an electronic file header that includes an unencrypted identification of an encrypted document. Neither McGraw nor Chan disclose transmitting a password, along with an encrypted document, to a printer. As noted above, McGraw does not transmit a password. Chan receives a password (identifier) at the server and transmits an encrypted session key. However, neither of these operations can be described as transmitting a password to a printer. Neither McGraw nor Chan disclose comparing a recipient-entered password to a transmitted password. As noted above, McGraw does not compare passwords, while Chan compares passwords (identifiers) at the server, but not at the printer. Therefore, even

if elements from Chan are combined with McGraw, that combination does not explicitly disclose every limitation of claims 1 and 10. Claims 3-4, 7-8, dependent from claim 1, and claims 12-13 and 16-18, dependent from claim 10, enjoy the same advantages.

The Office Action states that it would have been obvious to combine password comparison features with McGraw in order to increase the security of remote printing. In response, it is noted that it is not feasible to send a password in a fax transmission. If the password appears in the unencrypted header section, then the password server no purpose (as it can be read by all parties). If the password appears in the encrypted body of the fax, then the recipient is unaware if the password is even present. Further, an encrypted password could only be revealed after the fax is decrypted. Thus, there is no motivation for a person of ordinary skill in the art to modify McGraw's fax system in such a way as to include a password matching feature. Alternately stated, fax and print document protocols are completely different, and no evidence has been provided that password features, which are possible in the transmission and storage of print jobs, can be applied to fax transmissions. As noted above, fax transmissions send simple image data. A fax transmission cannot be broken into header/main body/password segments.

Neither has evidence been provided that it would have been generally known at the time of the invention to add electronic print job file features to fax transmissions to fax transmission protocols. That is, the obviousness rejection must provide evidence that such a modification would have been obvious to one with skill in the art based upon what was well known at the time of the invention. "(A)nalysis [of whether the subject

matter of a claim would have been obvious] need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1740-41, 82 USPQ2d 1385, 1396 (2007). However, if the *prima facie* rejection is supported by what was known by a person of ordinary skill in the art then additional evidence should have been provided. Notable, when the source or motivation is not from the prior art references, "the evidence" of motive will likely consist of an explanation or a well-known principle or problem-solving strategy to be applied". *DyStar*, 464 F.3d at 1366, 80 USPQ2d at 1649.

The only principle or problem-solving strategy mentioned in the Office Action is "secure remote printing". The Office Action does not supply evidence that it was well known at the time of the invention to modify fax transmission protocol to include header and password sections that can be differentiated from the main body of a fax message.

A *prima facie* analysis of motivation is especially critical in the present circumstances since the rejection is predicated on limitations that are not explicitly disclosed in the prior art references. The claimed invention can only be obvious if an artisan makes substantial modifications to the McGraw. However, there is nothing in the Chan reference that suggests a modification. Further, no evidence has been provided that such a modification would have been obvious based upon well known principles.

With respect to the second analysis criteria needed to support the G) obviousness rationale, even if a practitioner were given the Chan and McGraw references as a foundation, no evidence has been provided to show

that there is a reasonable expectation of success in the claimed invention. That is, there can be no reasonable expectation of success if the references, and what was known by artisan at the time of the invention, do not teach all the limitations of the claimed invention.

In summary, the Applicant respectfully submits that a *prima facie* case of obvious has not been supported since the combination of McGraw and Chan does not explicitly disclose every limitation of claims 1 and 10. Neither has a case been supported that McGraw can be modified to supply the missing limitations in view of Chan, or what was well known by a person of skill at the time of the invention. Therefore, the Applicant requests that the rejection of claims 1, 3-4, 7-8, 10, 12-13, and 16-18 be removed.

It is believed that the application is in condition for allowance and reconsideration is earnestly solicited.

Respectfully submitted,

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Gerald Maliszewski
Registration No. 38,054

Customer Number 55,286
P.O. Box 270829
San Diego, CA 92198-2829
Telephone: (858) 451-9950
Facsimile: (858) 451-9869
gerry@ipatentit.net

appendix A

Home

⇧Up

Group 3 Facsimile Communication

Essay for CS4323 - Dr. Letcher

Introduction

Facsimile machines, commonly known as, "fax machines," have been in use for many years – in fact, the first one was patented in 1843! However, fax machines were not widely used until the 1970's. The first fax machines were analog devices, and consequently they printed information at the exact time that they received it. The receiving machine would need to be at the correct place on the page to correspond with the information being sent. This required very accurate synchronization, and many times the resulting image was corrupted. Even on a single line, the printing was susceptible to "jitters."

Some of the earliest standards for fax machines used relatively slow communication with no compression. One standard, classified as, "Group 1," used a very straightforward frequency modulation to convey image information. Each frequency indicated a different color, and there were only two colors: 1300Hz represented a white pixel, and 2100Hz represented a black pixel. This method would normally take about six minutes to transmit a single page of information.

Group 2 changed the modulation method to amplitude modulation, and suppressed the sideband to compress bandwidth. White pixels were indicated by the maximum amplitude signal, and black pixels were indicated by the minimum amplitude signal. This resulted in a transmission time of approximately three minutes per page.

Currently, the most widely used type of facsimile transmission is Group 3. This type of fax communication uses a modulation method that combines amplitude and phase modulation. Furthermore, the digital data is compressed using run-length encoding, resulting in a transmission time of less than one minute per page. One other type of fax, Group 4, is used primarily with Public Data Networks. Here, we will deal with the required parts of Group 3, which is the most popular and is used over standard telephone lines.

Standards-Making Groups

The Group 3 specification was mostly formed by the International Telegraph and Telephone Consultative Committee (CCITT). The CCITT is part of the International Telecommunication Union (ITU), which is part of the United Nations. Participating countries have signed treaties which allow

the resulting standards to be meaningful. In the United States. The Telecommunication Industries Association (TIA), which is part of the Electronic Industries Association (EIA), is responsible for handling telecommunication matters. The TR-29 group, Facsimile Equipment and Systems, eventually became the U.S. fax technical group for CCITT.

TR-29 has been very active in helping create fax standards. In fact, TR-29 produced the U.S. national standards for Group 3 and Group 4 before the CCITT standards were published. There are therefore separate standards numbers for EIA and CCITT: "Group 3 Apparatus for Transmission" is both EIA-465 and CCITT T.4, while "Procedures for Document Facsimile Transmission" is both EIA-466 and CCITT T.30.

Image Acquisition and Manipulation

Image data is typically acquired from a page using a Charge Coupled Device (CCD) which senses the brightness of the pixels on the page.

Transmission

CCD -> A/D Converter -> MH/MR/MMR Compression

The CCD reads the data from the page using 1728 pixels per line. Two lines of 1728 pixels each are read into memory and manipulated at a time. These two lines are compressed using three compression methods: Modified Huffman (MH), modified read (MR), and modified modified read (MMR). These methods are referred to as *run-length encoding*. This encoding results in information that is 1.5th to 1/20th of its original size. This data can be further compressed by the digital modulation method used, which will be discussed later. The receiving procedure is the opposite of the transmission procedure.

Modified Huffman Coding

One of the compression methods used is a modification of the Huffman coding which was relatively simple to implement and royalty free when Group 3 was being developed. This is a run-length encoding method, which means that it uses special binary values to represent *runs* of various lengths. Usually, pixels are likely to be followed by a pixel of the same color – it is very unlikely that pixels will alternate between one black and one white pixel. Therefore, the substitution of certain predefined codes for black or white runs of certain lengths results in less bits. Redundant information is eliminated.

Modified Read and Modified Modified Read Coding

Similarly, there is usually a high incidence of black or white duplication in

the vertical direction. Two lines are scanned in at a time, and many times the MR and MMR methods of compression, which use vertical duplication to compress data, result in a higher degree of compression than the Modified Huffman coding. Facsimile machines can thus choose among methods to achieve the highest compression.

Group 3 Modulation Methods

Group 3 can use several baud rates, which, based upon the different phase changes, can produce several data transfer speeds measured in bits per second (bps). Of these modulation methods, the CCITT Recommendation T.4 only requires support of two: V.27ter for sending data at 4800 and 2400bps, and V.21 for 300bps handshake signaling. V.21 is used mainly before and after each page; V.27ter is used for the transmission of actual image data. The other modulation methods are optional. Here, we will only discuss the two required types, V.27ter and V.21. V.21, being only a handshaking method, is not shown on the chart.

Bits per Second (BPS)	Baud Rate	Bits per Sample	Type	Carrier Frequency	Bandwidth (in Hertz)
14400bps	2400 baud	6	V.17	1800Hz	550-3050
12000bps	2400 baud	5	V.17	1800Hz	550-3050
9600bps	2400 baud	4	V.29	1700Hz	450-2950
7200bps	2400 baud	3	V.29	1700Hz	450-2950
4800bps	1600 baud	3	V.27ter	1800Hz	950-2650
2400bps	1200 baud	2	V.27ter	1800Hz	1150-2450

V.27ter Modulation

This type of data modulation is the only one required for fax transmission. It uses phase changes to indicate different pixel states or, as we have seen, binary digits representing pixels in compressed format. When V.27ter changes phase 1200 times a second (1200 baud), it uses one of four different phases to indicate one of four different values, which is the same information encoded in two bits. Therefore, at 1200 baud, each change in phase holds the information of two bits, resulting in a doubling of the

information being passed across the telephone lines – 2400bps.

V.27ter can also operate at 1600 baud. At this rate of phase change, each change represents one of eight possible phases, which is the same information that is encoded in three bits. Since each phase change sends three bits of information, the effective data rate is three times as much – 4800bps. Both baud rates of V.27ter are shown in the tables below.

4800bps			
Tribit Values			Phase Change
0	0	1	0
0	0	0	45
0	1	0	90
0	1	1	135
1	1	1	180
1	1	0	225
1	0	0	270
1	0	1	315

2400bps		
Dibit Values		Phase Change
0	1	0
0	0	90
1	0	180
1	1	270

V.21 Modulation

V.21 is not used to transmit normal image data; rather, it is used as a handshaking message modulation. This modulation technique is used to negotiate image data rate, image resolution, image compression, and other image and communication aspects. V.21 operates at the relatively slow speed of 300bps half duplex. Using Frequency Shift Keying (FSK), this method represents binary information by two frequencies. A binary zero is represented by 1850 Hz, and a binary one is represented by 1650 Hz.

Fax Call Connection Procedures

Two Group 3 fax machines have a certain procedure for connecting, transmitting one or more pages, and disconnecting. One fax machine takes on the job of initiating the connection; we will refer to this machine as the *sender*. The other machine, which we will refer to as the *receiver*, follows certain procedures for responding to the initiated connection and receiving the image being transferred. CCITT Recommendation T.30 lays out five procedures for this process, which are referred to as Phases A-E. They consist of the *Call Establishment*, *Pre-message Procedure*, *Message Transmission*, *Post-message Procedure*, and *Call Release*.

Phase A — Call Establishment

A fax call may be established manually or automatically. In this phase, the sender dials the number of the receiver, and immediately begins transmission of a *fax announce tone*, which is a 1100 Hz tone which lasts for ½ second, and is repeated every three seconds. This tone indicates that the incoming call is a fax transmission. Once the receiver goes off hook, it can recognize the fax announce tone and continue with the transmission. Furthermore, in manual operation, a human operator can recognize the tone as a fax transmission, and instruct the fax machine to continue with the transmission.

Once the receiver recognizes the incoming fax transmission as such, it transmits the *fax answer tone*. This tone is generated at 2100 Hz and lasts for three seconds. The sender will then know that the call has been recognized by the receiver, and the transmission can go to the next phase. If the call is being placed manually, the operator on the sender side will recognize the fax answer tone, and he/she can instruct the sending machine to continue with the transmission.

Phase B — Pre-message Procedure

In Phase B, the fax machines use V.21 at 300bps FSK to perform handshaking. First, the receiver sends a Digital Identification Signal (DIS), which specifies the unit's capabilities. The sender detects the DIS, and transmits a Digital Command Signal (DCS), which specifies the transmission parameters. The receiver then detects the DCS, and the transmission may advance to the next phase. There is also a Digital Transmit Command (DTC) which is a polling request for pollable documents and capability definition.

Pre-message handshaking uses 300bps FSK to transmit information in the following format: First, for each code (DIS, DCS, or DTC) there is a preamble which insures that the following data will be able to pass unimpaired. This is usually a series of flag sequences for one second. Then, the following information is passed from sender to receiver:

Flag (7Eh)	Address (FFh)	Control (C8h)	Message Type (DIS, DTC or DCS)	Fax Info (3 or more bytes)	Frame Checking (2 bytes)	Flag (7Eh)

Flag
: 01111110

Address
: 8 bits

Control
: 8 bits

Message Type
: 8 bits

Fax Info
: Three or more bytes

  Byte 1
  : Group 2 capabilities (00 if no Group 2 capability)

  Byte 2
  : Data rate and resolution capabilities

  Bytes 3
  : Paper size and scan time capability

  Bytes 4-N
  : Error Correction Mode (ECM) and enhanced features support

Frame Checking
: Two bytes

Flag
: 01111110

Phase C — Message Transmission

During the message transmission phase, the sender first sends phasing training information (referred to as the TCF pattern), which can be anywhere from 2400bps to 14400bps. This is necessary to establish at what speed both sender and receiver can reliably transmit the image data. If something goes wrong, the receiver will send back a Failure to Train (FTT) message, which indicates that retraining should occur. If the training occurred correctly, the receiver sends back a Confirmation to Receive (CFR), which indicates that the training was successful and the receiver is ready for the actual image data.

At this point, the sender sends the image data to the receiver using one of the modulation techniques described above (V.27ter, V.29, or V.17). As mentioned earlier, the image data can be sent faster than the baud rate because of two things: a) pre-sending image data compression, and b) phase modulation which allows multiple bits to be sent with each phase change.

Phase D — Post-message Procedure

After the digital image data has been send across the communication channel, the sender sends a Return to Control (RTC) code, which switches both faxes back to 300bps. The sender then sends another code, called the End of Procedure (EOP) signal. The receiver acknowledges the end of the transmission, and sends a Message Confirmation (MCF) which indicates that the receiver received the page successfully.

Phase E — Call Release

To complete the call, the sender sends another code, the Disconnect (DCN) signal to the sender. Then, both fax machines disconnect from the telephone line. At this point, another transmission can occur, starting at Phase A.

Error Control

The original Group 3 specification doesn't use any true error-detection or correction aspects. Recently, however, there have been two additions to the classic Group 3 transmission methods. One limits the effects of errors, and the other offers true error detection and correction.

The first method applies to the Modified Huffman coding. Each 1728-pixel line is divided into groups and encoded separately. This is supposed to limit any errors to a portion of the scan line instead of the entire line. However, the improvements from this technique are minor.

The second method is more widespread, and offers true error-correction. This method divides the image data into High-level Data Link Control (HDLC) frames of 256 bytes each. After each frame, a redundancy code is transmitted, which allows the receiver to detect any errors in the transmitted frame. After the entire page has been transmitted, the receiver requests the frames which contained errors. If the same frame is requested four times because of errors, the transmission will stop or a lower speed will be negotiated.

This second method uses 16-bit Cyclic Redundancy Checking (CRC) to detect errors, using the following polynomial generator: $X^{16}+X^{12}+X^{5}+1=10001000000100001$. This method also uses "bit stuffing" in order to prevent the transmission of the flag character (7Eh). A zero is inserted after every five consecutive ones, except for the flag character. Therefore, one the receiving end, if the sixth character is a zero, it is thrown out. If it is a one, then the flag character has been transmitted.

The Future of Fax

Facsimile communication will continue to evolve. Additions will undoubtedly be made to the Group 3 specification, as has been done in the past. The rise of low-cost computers and communication equipment will certainly

bring more improvements to facsimile procedures. The Internet has grown in popularity, and already there are already many ways to send faxes over this world-wide network of computers. The state of facsimile technology will continue to improve, getting "crisper" with every copy.

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